

- mixed-species bird flocks. *Auk* 122: 108-120.
- GOODALE, E. & S.W. KOTAGAMA (2005b): Testing the roles of species in mixed-species bird flocks of a Sri Lankan rainforest. *J. Trop. Ecol.* 21: 669-676.
- HUTTO, R.L. (1994): The composition and social organization of mixed-species flocks in a tropical deciduous forest in Western Mexico. *Condor* 96: 105-118.
- KING, D.I. & J.H. RAPPOLE (2001): Kleptoparasitism of laughing-thrushes by Greater Racket-tailed Drongo in Burma (Myanmar). *Forktail* 17: 121-122.
- KOTAGAMA, S.W. & E. GOODALE (2004): The composition and spatial organization of mixed-species flocks in a Sri Lankan rainforest. *Forktail* 20: 63-70.
- MACDONALD, D.W. & D.G. HENDERSON (1977): Aspects of the behaviour and ecology of mixed species bird flocks in Kashmir. *Ibis* 119: 481-491.
- MOYNIHAN, M. (1962): The organization and probable evolution of some mixed-species flocks of Neotropical birds. *Smithson. Misc. Coll.* 143: 1-140.
- PARTRIDGE, L. & R. ASHCROFT (1976): Mixed-species flocks of birds in hill forest in Ceylon. *Condor* 78: 449-453.
- ROBIN, V.V. & P. DAVIDAR (2002): The vertical stratification of birds in mixed-species flocks at Parambikulam, South India: A comparison between two habitats. *J. Bombay Nat. Hist. Soc.* 99: 389-399.
- STOUFFER, P.C. & R.O. BIERREGAARD, JR. (1995): Use of Amazonian forest fragments by understory insectivorous birds. *Ecology* 76: 2429-2445.
- THIOLLAY, J.M. (1992): Influence of selective logging on bird species diversity in a Guianan rain forest. *Conserv. Biol.* 6: 47-60.
- THIOLLAY, J.M. & M. JULLIEN (1998): Flocking behaviour of foraging birds in a neotropical rain forest and the antipredator defence hypothesis. *Ibis* 140: 382-394.

12. ADDITIONS TO THE AVIFAUNA OF GOA, INDIA¹

S.D. BORGES^{2,3} AND A.B. SHANBHAG^{2,4}

¹Accepted June 07, 2004

²Department of Zoology, Goa University, Taleigao Plateau, 403 206, Goa, India.

³Email: sonalidbr@yahoo.com

⁴Email: abshanbhag@yahoo.com

The first report on the birds of Goa in 1976 recorded 154 species (Grubb and Ali 1976). Subsequently Saha and Dasgupta (1992) raised the number of species to 208. All the reports thus far were based on opportunistic surveys, mostly of forested regions, none of them exceeding 16 days. In 1996, the ecological research on wetlands and waterbirds of the state was initiated at three freshwater bodies (Walia and Shanbhag 1996; Shanbhag *et al.* 2001). Around the same time, Lainer (1999a, b) reported 382 species, increasing the number of avian species of Goa to 174.

However, not much was known of the ecology and bird fauna of estuarine wetlands in the state. The Sálím Ali Bird Sanctuary, the only one of its kind in the state within the estuarine belt, though notified in 1988, was not an exception. Therefore, a detailed three year study was initiated to understand the ecology of the Mandovi estuarine wetland in general and its avifauna in particular (Borges 2003). In the course of this study, encompassing the deltaic islands of Choraó, Diwar, Choraó Minor and the estuarine banks of Ribandar (Fig. 1), observations were carried out by boat as well as on foot, using 12 x 25 binoculars and a 15-45 x 60 spotting scope. Birds were identified using standard field guides (Sonobe and Usui 1993; Ali 1996; Grimmett *et al.* 1998).

During the study, a total of 151 species, both resident and migratory birds were recorded, eight of which were new sightings or confirmations for the Goa region.

These eight species were sighted on more than one occasion. This paper records sightings, microhabitat utility and behavioural attributes of these species.

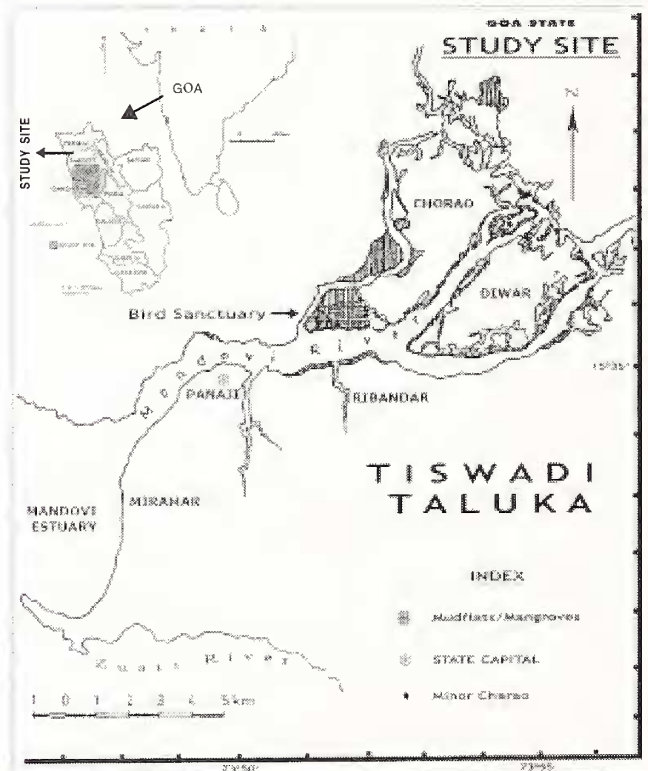


Fig. 1: Map of the study site

1. **Little Bittern** *Ixobrychus minutus*

Some bitterns, slightly smaller than the chestnut bittern frequented the estuarine islands during the monsoon of 1999 and 2000. The distinct greyish black crown and brown scapulars confirmed that the birds were female little bitterns. A lone female bird was sighted on the northern side of Chorao Minor on June 17 1999, and again on September 27, 1999. Two more birds were encountered, one each in the driest region of the exposed mudflat of Chorao Minor (August 29) and Chorao (September 5). In 2000, three female Little Bitterns were flushed from reed-beds of Chorao in August, while another was observed at Chorao Minor in September. The solitary female was seen again in December at Chorao Minor. Three more females were flushed from the reed-beds at Chorao a month later.

In November 2000, a similar sized bittern was seen crouching amongst the pneumatophores and stilt roots in the interiors of the Bird Sanctuary. Initially mistaken for a male Yellow Bittern *Ixobrychus sinensis*, it was confirmed to be a male Little Bittern, owing to its deep black back, and the absence of a dark strip along the centre of the neck. Two more male little bitterns were sighted at Chorao Minor in February 2001.

Little Bitterns are known to breed in the tall reed beds of Kashmir and Assam during the monsoon (Holmes and Parr 1989). Although there have been a few stray sightings elsewhere, only a couple of these sightings have been from as far down as coastal islands off Mumbai (Abdulali and Grubh 1966), and southern Karnataka (Grimmett *et al.* 1998). Sporadic sightings of a few little bitterns in the estuary numbering not more than three per encounter may be construed as their being stranded break-away exploratory factions, or even failed wintering attempts by small non-breeding populations towards the west coast of the country.

2. **Black Bittern** *Dupetor flavicollis*

Two male birds were sighted perched on fishing stakes, one at Ribandar and one at Chorao Minor in June 5, 1999 and November 21, 1999 respectively. On December 21, 1999, two more birds were observed perched on stilt roots at Chorao Minor while a lone bird was sighted on a mound of stones along the river's edge at Chorao. The bird was seen yet again in January and March 2000, at Chorao and Ribandar respectively. In August 2000, three black bitterns were noticed at Chorao while one bird was seen at the same site in November. Two birds were observed at Chorao Minor in December 2000 and one bird each was sighted at Ribandar, Chorao and Chorao Minor in January 2001.

The Black Bittern has been described as a widespread, resident throughout India with scattered distribution (Ali 1996). It has been observed to breed in Kerala (Neelakantan 1956), and move towards Tamil Nadu during the non-breeding

season (Joshua and Johnsingh 1985). Considering its distribution all along coastal Kerala and Karnataka, on the west coast of India, its sighting in the coastal belt of Goa only amounts to marginal extension in the range of the species.

3. **Black Ibis** *Pseudibis papillosa*

Three of these red-capped black birds with white shoulder patches were observed feeding actively on the insects and crustaceans on the exposed mudflats of Chorao Minor and Ribandar on April 21, 1999. At Ribandar, one of the birds was seen jabbing at a mudskipper, *Boleophthalmus* sp. In April 2000, two Black Ibises were sighted on the Ribandar mudflats, while four birds were recorded at Chorao Minor. The latter were present for approximately 20 minutes and took off en bloc in a north-easterly direction. Exactly a year later, two more birds of the species were sighted at Ribandar.

The Black Ibis, a resident throughout the Indian peninsula is a regular visitor to the better-watered parts of Maharashtra (Jamdar and Shrivastava 1990). As Goa neither lacks the habitat requirements for Ibises in general (Lainer 1999a; Shanbhag *et al.* 2001), nor is it too far flung from Maharashtra, the regular seasonal sightings of a few individuals of the species can be taken as probable attempts towards its range extension.

4. **Jack Snipe** *Lymnecryptes minimus*

On the evening (1500 hrs) of April 12, 2000, a bird each of the species was flushed out at two separate locations from the tall reed swamps adjoining the mudflat at Chorao. The birds were smaller than other snipes, had shorter and stouter bills and a split supercilium. Both birds were flushed during a foot trail through the northern side of the marsh, at a distance of roughly 40 m from each other. These sightings confirm the earlier 'unconfirmed report' (Lainer 1999b), as to the possible occurrence of the species in the state.

5. **Red Knot** *Calidris canutus*

Two sandpipers slightly larger than Little Stints were observed feeding actively in mixed flocks of waders. The birds were observed to feed on larger benthic polychaetes, particularly nereids, on the mudflats of Chorao on October 25, 1999. The birds were confirmed to be Red Knots owing to their stout stature, short straight bill and dull grey upperparts. In the year 2000, a single bird each was sighted in January on the Ribandar mudflat, and in March and November at Chorao Minor. On all three occasions, the birds were feeding actively on the algae and the wet sediment close to the surf line, probably on crustaceans. However, at all the sites the birds were present for a brief period of less than 45 minutes.

6. Pied Avocet *Recurvirostra avosetta*

This conspicuous pied wader with a slender, but prominently upturned bill, was observed feeding in the shallow water below the surf line at Chorao Minor on April 21, and May 19, 1999. The birds fed by continuously moving their heads from side to side with half the bill immersed in water, a characteristic of avocets. In December 1999, two Pied Avocets were seen feeding actively in the shallow waters of Diwar at about 1600 hrs. In April 2000, a lone Pied Avocet was seen foraging at Chorao Minor, amidst other waders.

In India, there are records of Red Knots and Pied Avocets wintering in parts of Kerala (Namassivayan and Venugopal 1989), and on the coast of Tamil Nadu (Balachandran 1995). Considering the contiguity of the long coastline of Kerala/ Karnataka with Goa, the regular sightings of a few Red Knots and Pied Avocets along with other waders may be logically acceptable, as tropical estuarine wetlands are known to be of great dietary significance to migrant waterbirds (Wootton 1997). Hence, the occurrence of Red Knots and Pied Avocets on the Mandovi estuarine mudflats is not surprising, as the sites are rich in benthic invertebrates (Borges 2003). The regular sighting of a few avocets particularly in summer indicates that the Mandovi estuarine mudflats are probably being used as potential stopover sites by the species.

7. Great Stone-Plover *Esacus recurvirostris*

A single bird was sighted consistently for a period of three months from November 2000 to January 2001 in the deeper reaches of the bird sanctuary. The shy wader with large eyes and a stout bill was observed to feed on mud crabs, *Grapsus* sp. The bird was quick to dart away into the thick mangrove vegetation when confronted with even the slightest disturbance.

The Great Stone-Plover is known to inhabit a variety of habitats ranging from semi-dry pockets of the Thar

desert (Sangha 2002) to the coastal mudflats of Kerala (Nameer 1992) and Tamil Nadu (Balachandran 1995). The sighting of the Great Stone-Plover at Chorao was an extremely rare occurrence, considering that only one bird was sighted during the entire study period of three years. The species is described to be 'resident subject to local movements' with one of the breeding stretches across Karnataka (Grimmett *et al.* 1998). As the bird sighted did not show any indication of injury, it could be a case of sheer stray vagrancy.

8. Desert Wheatear *Oenanthe deserti*

The sandy buff-coloured sparrow-sized birds were observed, perched in small flocks, on electric wires, overlooking freshly harvested paddy fields at Chorao and Diwar in September 2000. The birds were confirmed as Desert Wheatears by their black throats, buff white underparts and blackish brown wings and tails. While seven birds were counted at Chorao, 12 of them were sighted at Diwar. At both the sites, the flocks consisted of both the sexes. At Chorao, the birds remained undisturbed by the paddy-thrashing activity nearby, regularly alighting on the ground to pick the insects.

Desert Wheatears affect habitats ranging from dry scrubland to canal irrigated agricultural plots. The species, a regular winter visitor to central Maharashtra and north Andhra Pradesh, tends to winter even in Madras (Santharam 1989). As such, the species may have strayed into the state and having found suitable conditions, stayed on, as was the case with the Great Stone-Plover.

ACKNOWLEDGEMENTS

We thank the Goa State DSTE for funding part of the work through research project No.3-2-91-STE/(Part)/1063 to Dr. A.B. Shanbhag. The facilities provided by the Goa University are duly acknowledged.

REFERENCES

- ABDULALI, H. & R.B. GRUBH (1966): Extension of range of *Ixobrychus minutus minutus* (Linnaeus) an addition to the avifauna of Bombay area. *J. Bombay Nat. Hist. Soc.* 63(1): 198.
- ALI, S. (1996): The Book of Indian Birds. Bombay Natural History Society and Oxford University Press, Mumbai. Pp. 354.
- BALACHANDRAN, S. (1995): Shorebirds of the marine national park in the Gulf of Mannar, Tamil Nadu. *J. Bombay Nat. Hist. Soc.* 92(3): 303-311.
- BORGES, S.D. (2003): Studies on the ecology of wader birds of the Mandovi estuary of Goa, India. Ph.D. thesis submitted to Goa University.
- GRIMMETT, R., C. INSKIPP & T. INSKIPP (1998): Birds of the Indian Subcontinent. Oxford University Press, Delhi. Pp. 888.
- GRUBH, R.B. & S. ALI (1976): Birds of Goa. *J. Bombay Nat. Hist. Soc.* 73: 42-53.
- HOLMES, P.R. & A.J. PARR (1989): A checklist of the birds of Haigam Rakh-Kashmir. *J. Bombay Nat. Hist. Soc.* 85(3): 465-473.
- JAMDAR, N. & K. SHRIVASTAVA (1990): Black Bittern *Ixobrychus flavicollis* (Latham) and addition to the avifauna of Maharashtra. *J. Bombay Nat. Hist. Soc.* 87(2): 289.
- JOSHUA, J. & A.J.T. JOHNSINGH (1985): Observations on birds of Mundanthurai Plateau, Tamil Nadu. *J. Bombay Nat. Hist. Soc.* 85(3): 565-567.
- LAINER, H. (1999a): The Birds of Goa (Part I). *J. Bombay Nat. Hist.*

- Soc.* 96(2): 203-220.
- LAINER, H. (1999b): The Birds of Goa (Part II). *J. Bombay Nat. Hist. Soc.* 96(3): 405-422.
- NAMASSIVAYAN, L. & P. VENUGOPAL (1989): Avocet *Recurvirostra avosetta* in Kerala. *J. Bombay Nat. Hist. Soc.* 86(3): 447.
- NAMEER, P.O. (1992): Great Stone-Plover *Esacus magnirostris* (Viellot) in Kerala. *J. Bombay Nat. Hist. Soc.* 89(1): 118.
- NEELAKANTAN, K.K. (1956): Some observations on the breeding behavior of the Chestnut Bittern *Ixobrychus cinnamomeus* (Gmelin) and the Black Bittern *Dupetor flavicollis* (Latham). *J. Bombay Nat. Hist. Soc.* 53(4): 704-705.
- SAHA, B.C. & J.M. DASGUPTA (1992): Birds of Goa. Zoological Survey of India, Calcutta. Pp. 56.
- SANGHA, H.S. (2002): A supplementary note on the avifauna of the Thar desert (Rajasthan). *J. Bombay Nat. Hist. Soc.* 99(1): 120-126.
- SANTHARAM, V. (1989): The Desert Wheatear *Oenanthe deserti* in Madras. *J. Bombay Nat. Hist. Soc.* 86(3): 452.
- SHANBHAG, A.B., R. WALIA & S.D. BORGES (2001): The impact of Konkan Railway Project on the avifauna of Carambolim Lake in Goa. *Zoos' print Journal* 16(6): 503-508.
- SONOBE, K. & S. USUI (1993): A Field Guide to the Waterbirds of Asia. Wildbird Society of Japan, Tokyo. Pp. 224.
- WALIA, R. & A.B. SHANBHAG (1996): Birdlife at Santa Monica Lake, Goa: An integrated ecological study. Pp. 63. In: Proceedings of Pan-Asian Ornithological Congress and XII Birdlife Asia Conference, Coimbatore, India. 9-16 November.
- WOOTTON, J.T. (1997): Estimates and tests per capita interaction strength: diet abundance and impact of intertidal foraging birds. *Ecol. monogr.* 67(1): 45-64.

13. HOLE-NESTING IN CAPTIVE *INDOTESTUDO TRAVANCORICA*¹

MADHURI RAMESH²

¹Accepted September 10, 2004

²Centre for Herpetology, Madras Crocodile Bank, Mamallapuram, P.O. Bag 4, 603 104, Tamil Nadu, India.

Email: madhurir@hotmail.com

The Travancore Tortoise *Indotestudo travancorica* is a medium-sized testudine endemic to the Western Ghats of India. Auffenberg (1964) reported the breeding season as extending from November to January, but other authors believe that this tortoise may breed at other times of the year (Vijaya 1983; Moll 1989; Sane and Sane 1989; Das 1991). While nesting the female lays 1-3 eggs on the ground or in a shallow nest of leaf litter, and hatchlings are obtained in June (Das 1991).

In India, the Centre for Herpetology, Madras Crocodile Bank has the only captive breeding group of this species (Andrews and Whitaker 1993), consisting of three males and six females (Table 1; individual animals could be clearly

distinguished by natural markings on the carapace, and were assigned an alphabetic identity code). Enclosure utilization (Ramesh 2002) and breeding behaviour of the Travancore Tortoise was observed from July to December 1999. Contrary to existing literature, hole-nesting was observed during the study period, and has been reported here for the first time.

Table 2: Measurements of eggs of captive *Indotestudo travancorica* at the Madras Crocodile Bank

Clutch	Eggs	Av. L ± SD	Av. W ± SD	Av. Wt ± SD
June 1999				
1	5	44.52 ± 3.02	36.45 ± 0.59	-
2	5	48.06 ± 1.2	37.29 ± 0.83	-
3	3	49.18 ± 0.98	39.25 ± 0.89	-
4	2	44.22 ± 0.22	35.6 ± 1.2	-
December 1999				
1	3	45.77 ± 1.13	35.91 ± 1.12	34.9 ± 2.85
2	4	49.01 ± 0.87	39.41 ± 0.42	44.5 ± 1.87
3	3	44.73 ± 0.49	37.08 ± 0.31	36.03 ± 0.74
4	2	47.4 ± 1.1	36.7 ± 0.45	38.1 ± 2.1
5	3	46.47 ± 3.54	37.5 ± 0.23	38.06 ± 1.18
6	3	48.47 ± 2.72	38.77 ± 0.45	43.43 ± 1.44
7	2	42.22 ± 0.43	36.18 ± 0.27	33.05 ± 0.45
8	2	53.1 ± 0.4	42.38 ± 0.17	57.1 ± 0.1
9	3	45.3 ± 0.75	36.5 ± 0.06	36.07 ± 0.88
10	4	44.39 ± 1.4	37.5 ± 0.51	36.25 ± 2.17
11	3	50.48 ± 0.83	39.62 ± 0.51	47.3 ± 1.51

Table 1: Measurements of the captive breeding group of adult *Indotestudo travancorica* at the Madras Crocodile Bank

Code	Sex	CCL	CCW-F	CCW-R	PI	PW	WT
SC	M	35	28.5	26	24	21.5	4.25
ST	M	39	30.5	28	23	23	4.5
B	M	26	22.5	20	18	16	2
Y	F	25	20	19	17.5	16	2
L	F	31	26	23	21.5	19	3
CL	F	28	21.5	21	17	17	2.75
D	F	30	26	24	21.5	19.5	3
P	F	26	22	19	19	15.5	2.75
PH	F	28.5	24	22.5	19.5	17	2.5

CCL: curved carapace length, CCW-F: curved carapace width (front), CCW-R: curved carapace width (rear), PL: plastron length, PW: plastron width; all in cms. WT: weight (kg), M: Male, F: Female.

Av. L: Average Length, Av. W: Average Width, Av. Wt: Average Weight